UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C., 20460

ENVIRONMENTAL FATE AND EFFECTS DIVISION OFFICE OF PESTICIDE PROGRAMS

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PC Code: 114402
Chemical: Sodium Acifluorfen
Related Chemical: Lactofen (PC Code 128888)
DP Barcode: D278403

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THRU: Kevin Costello, Acting Branch Chief
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RE: Response to the ecological effects portion of BASF's "60-day comments" on the draft RED on Sodium Acifluorfen posted to the Public Docket OPP-34241.

EFED has reviewed the ecological effects portion of BASF's "60-day comments" on the Environmental Risk Assessment for the reregistration of the herbicide sodium acifluorfen. Our response is attached.

ECOLOGICAL EFFECTS ISSUES

BASF Comments.
Refutation of EFED's assumptions of a 30-day foliar dissipation half-life and treated fields providing 100% of the diet of birds and mammals.

EPA states that it has performed a screening level assessment and a higher tier modeling assessment of the risk that acifluorfen may pose to birds and concludes that there may be a chronic risk to birds that eat short grass and to insects after the use of the compound on peanuts, soybeans, or rice. BASF has submitted a study (MRID 440911-01) entitled "Foliar Dislodgable Residues of Blazer on Soybeans" which reports a half-life of less than one day on the treated plants and no detectable residues after 3-5 days. A more realistic assessment that includes a 7-day half-life and a smaller fraction of the diet obtained from the treated field would result in Risk Quotients below EPA's Level of Concern.

EFED Response:
While the results of MRID 440911-01 are of interest, they are not useful in developing a foliar dissipation half- life. The authors stated the following: ". . . in a study of this type it is impossible to determine if the residues have actually dissipated or if they have been rendered non-dislodgable by some other process (*e.g.*, binding). The term dissipation in this report is meant to express only the reduction of dislodgable residues with time."

The Agency does not possess BASF's reference to unnamed preliminary guidance by the EU in which a 7-day half-life in various media is discussed the Agency can not address the findings. EFED will retain the assumption of a 30-day half-life, even though the work of Willis and McDowell (1987) suggests a default half-life of 35 days appropriate.

Sodium acifluorfen will be applied after the emergence of weeds as well as the crop. They serve birds and mammals as food, cover, and as a source of invertebrates. EFED did acknowledge the uncertainty associated with risk to vertebrates in the original assessment.

In light of some of BASF's comments a series of ELL fate runs were made with the lowest application rate (0.25 lbs a.i./A) and half-lives of 3-5 days based on the dislodgable residues as suggested by the registrant and 7 days based on the uncited results from the EU. Since the chronic NOAEC for birds is 20 ppm, even a single application yields RQs of 3 and 1.7 on short grass and broadleaves/small insects respectively. These RQs exceed the chronic LOC of 1 ranging from 2 days for (broadleaves) or 5 days for short grass (with a 3-day half-life) and 48 days for short grass (for the default of 30 days). See the attached spreadsheet outputs. In conclusion, because the chronic LOC is still exceeded, no changes will be made to the original risk assessment.

BASF Comments:
Chronic risk to aquatic animals in natural wavelength light.
"The Agency states that it is uncertain about the chronic risk of acifluorfen to freshwater and estuarine animals. However, based on the data set submitted and reviewed for acifluorfen, EPA, in chapter 3 of the preliminary risk assessment ('Integrated Environment Risk Characterization'), clearly states that no chronic risk is anticipated."

EFED Response.
The Agency has referred to a 20-fold toxicity difference in LOAEC between two fish early life stage studies on the rainbow trout (MRID 449632-01; D261358.DER.WPD)) for carfentrazone-ethyl (another phototoxic herbicide) as justification for concern for the potential increased risk posed by acifluorfen to aquatic organisms being exposed to natural sunlight. BASF has questioned the risk potential of acifluorfen. Although EFED recognizes that if the assumed factor (more accurately a 14 fold factor) would not significantly increase the risk of aquatic organisms exposed to acifluorfen, unless a study is conducted there is uncertainty as to the degree of potential risk.

EFED will require that an aquatic phototoxicity study be conducted. A fish early life stage study or an amphibian study using tadpoles are possibilities[1]. **The choice of an experimental subject and the protocol should be submitted for review and agreement by both parties prior to study initiation.**

The following are some of the areas to be addressed:

Endpoints- Behavioral observations should be made in addition to measurements of mortality, growth, weight, morphology, and appearance. Ideally, measurements of protoporphyrin and heme concentrations in the blood and protox activity in the liver of each test organisms should be made.

Light sources- Artificial light may be preferred to natural light that will vary in different regions and seasons as well as with weather. If artificial light is used, the light should resemble full, natural sunlight as closely as possible. No matter what the light source, the duration and intensity of UV and visible light should be reported at all wavelengths (200-800 nanometers).

Dark, light, and positive controls- As this study is intended to identify potential effects of light on LDPH toxicity, an appropriate study protocol should include a dark, or low light,

[1] Anuran amphibian species have been the focus of many phototoxicity studies (Zage *et al.,*, 1998; Hatch and Burton, 1998; Walker *et al*., 1998) and protocols for standard toxicity tests have also been published (ASTM, 1994). In nature, amphibians may be exposed to acifluorfen and its degradation products through run-off and spray drift or through seepage discharge of contaminated groundwater. They are also known to inhabit shallow water bodies that would be exposed to high levels of solar radiation. Therefore, amphibians may exhibit light-induced toxic effects.

control group. Another group that is not exposed to chemicals but exposed to full light should be included (a full light control). In addition to the dark and light controls, a positive control group using protoporphyrin IX would be useful.

Dosing- A range finding study should be conducted under defined low light conditions to identify an LC50 value and lower dose levels expected to be similar to controls. Doses used in the phototoxicity study should not be expected to result in significant mortality in low light controls. Dissolved concentrations of the test chemical should be confirmed by an appropriate analytical method.

Exposure chambers and light filters- Chambers should allow UV and visible light to penetrate. Any filters should be cured under the study light for 72-hours prior to study initiation to ensure consistent transmittance.

BASF Comments:
Risk of acifluorfen to nontarget terrestrial plants.
"The Agency states that it is uncertain about the risk of acifluorfen to nontarget terrestrial plants. BASF agrees . . . BASF is willing to work with the Agency to further define the risk."

EFED Response:
The registrant acknowledges that additional studies are needed. Since the original studies (MRID 449632-01) were performed with a highly diluted end use product much of the test material may have run off as it was applied. Therefore, using the end use product, both tier II seedling emergence (123-1) and vegetative vigor (123-2) studies should be repeated.

REFERENCES

American Society for Testing and Materials. 1994. Standard guide for conducting the frog embryo teratogenesis assay-*Xenopus*. E 1439-91. In *Annual Book of ASTM Standards*, Vol 11.5, pp. 825-835. Philadelphia, PA.

Hatch, A.C. and G.A. Burton, Jr., 1998. Effects of photoinduced toxicity of fluoranthene on amphibian embryos and larvae. Environmental Toxicology and Chemistry **17**: 1777-1785.

Walker, S.E., D.H. Taylor, and J.T. Oris. 1998. Behavioral and histopathological effects of fluoranthene on bullfrog larvae (*Rana catesbeiana*). Environ. Toxicol. Chem. **17**: 734-739.

Willis, G.H. and L.L. McDowell. 1987. Pesticide persistence on foliage. Reviews of Environmental Contamination and Toxicology, v.100. Springer-Verlag, New York.

Zaga, A., E.E. Little, C.F. Rabeni, and M.R. Ellersieck. 1998. Photoenhanced toxicity of a carbamate insecticide to early life stage anuran amphibians. Environmental Toxicology and Chemistry **17**: 2543 - 2553.